

REMARKS

This is a full and timely response to the Office Action mailed January 6, 2004.

No claims have been amended, cancelled or added. Thus, claim 1-16 are pending in this application.

Claim of Priority under 35 U.S.C. §119

Applicant wishes to thank the Examiner for his acknowledgement of receipt and recording of the priority papers in the application file.

Rejections under 35 U.S.C. §102

Claims 1, 5, 7, 14 and 15 are rejected under 35 U.S.C., 102(b) as being anticipated by Arima (U.S. Patent 5,741,622). Applicant respectfully traverses this rejection.

To constitute anticipation of the claimed invention, the cited reference must disclose each and every element of the claims. Here, in this case, Arima fails to disclose the limitation "*possessing no ethylenically unsaturated double bond*" recited in the claims.

Claim 1 of the present invention is directed to an alkali development type photocurable composition comprising in combination: (A) an alkali-soluble macromolecular binder having a weight-average molecular weight in the range of 5,000 to 100,000 and an acid value in the range of 50 to 150 mg KOH/g, and *possessing no ethylenically unsaturated double bond*, (B) an inorganic powder, (C) a photopolymerizable monomer, (D) a photopolymerization initiator, and (E) an organic solvent.

The alkali-soluble macromolecular binder (A) (*possessing no ethylenically unsaturated double bond*), is obtained by reacting (d) a compound possessing one glycidyl group and no ethylenically unsaturated double bond in its molecule with

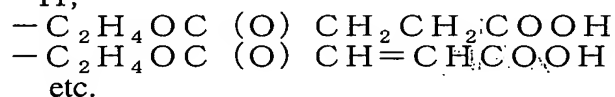
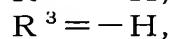
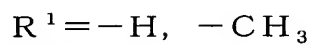
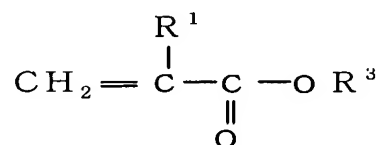
a carboxyl group of (A-1) a copolymer of (a) an ethylenically unsaturated bond-containing compound possessing one carboxyl group in its molecule with (b) an ethylenically unsaturated bond-containing compound possessing neither hydroxyl group nor acidic group in its molecule, the copolymer possessing no glycidyl group, or

a carboxyl group of (A-2) a copolymer of (a) an ethylenically unsaturated bond-containing compound possessing one carboxyl group in its molecule with (b) an ethylenically unsaturated bond-containing compound possessing neither hydroxyl group nor acidic group in its molecule and (c) an ethylenically unsaturated bond-containing compound possessing a hydroxyl group, the copolymer possessing no glycidyl group, and

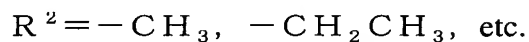
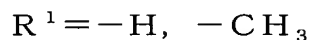
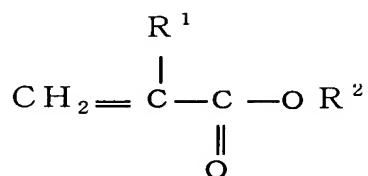
then causing (e) a polybasic acid anhydride to react with a secondary hydroxyl group caused by the above reaction and a primary hydroxyl group of the copolymer (A-2).

Some examples of components (a) to (e) mentioned above may be written as follows:

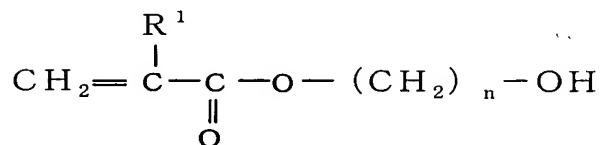
(a)



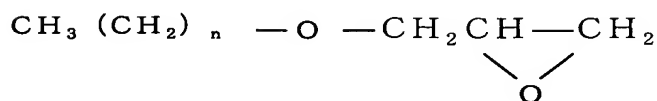
(b)



(c)



(d)



(e)

TPHA (tetrahydrophthalic anhydride)
 HHPA (hexahydrophthalic anhydride)
 etc.

The synthetic reaction steps of the alkali-soluble macromolecular binders may be represented as per the attached sheet (entitled "Present Invention"). As is clear from the attached sheet, both *macromolecular binders have no ethylenically unsaturated double bond and thus are not photosensitive resins*.

In contrast, Arima discloses a one-package type photosolder resist composition developable with an aqueous alkali solution, comprising (A) a copolymeric macromolecular compound having at least one free carboxyl group in its molecule or (A') a copolymeric macromolecular compound which has at least one free carboxyl group and *at least one photoreactive unsaturated group* in its molecule and which is in a solid state at normal room temperature, (B) a diluent including a polyfunctional unsaturated compound which is in a liquid state at normal room temperature and an organic solvent, (C) a photopolymerization initiator, (D) a vinyltriazine compound or a derivative thereof, and (E) an inorganic filler.

Although the copolymeric macromolecular compound (A) mentioned above have no photoreactive unsaturated group in its molecule, only a carboxyl group-containing resin (a) obtained by radically or anionically polymerizing *an unsaturated monobasic acid* with at least one *compound containing one unsaturated group* in its molecule is cited as the example thereof (see claim 1 and column 6, lines 10-28, of Arima).

This of course differs from the alkali-soluble macromolecular binder (A) of the claimed invention which, as stated earlier, is obtained by

(1) reacting (d) a compound possessing one glycidyl group and no ethylenically unsaturated double bond in its molecule with a carboxyl group of a copolymer (A-1), or a carboxyl group of a copolymer (A-2), and

(2) then reacting (e) a polybasic acid anhydride with a secondary hydroxyl group caused by the above reaction and a primary hydroxyl group of the copolymer (A-2).

Therefore, the copolymeric macromolecular compound (A) disclosed by Arima corresponds to the copolymer (A-1) of the claimed invention but not to the alkali-soluble macromolecular binder (A) of the claimed invention.

In addition, the copolymeric macromolecular compound (A') of Arima is also clearly distinguishable from the alkali-soluble macromolecular binder (A) of the claimed invention

The copolymeric macromolecular compound (A') of Arima includes:

(b) a carboxyl group-containing *photosensitive* resin produced by reacting (b-1) a

copolymer obtained by radically or anionically polymerizing an unsaturated monobasic acid with at least one compound containing one unsaturated group in its molecule, i.e. copolymer (a) mentioned above, with (b-2) a compound containing *one epoxy group* and *one unsaturated group* together in its molecule to induce an *addition reaction between the free carboxyl group of the copolymer (b-1) and the epoxy group of the compound (b-2)*, and (c) a carboxyl group-containing *photosensitive* resin produced by *causing (c-1) an unsaturated monobasic acid to react with an epoxy group in a side chain of (c-2) a copolymer of (c-2-1) a compound containing one epoxy group and one unsaturated group* together in its molecule *and (c-2-2) at least one compound containing one unsaturated group* in its molecule, and then causing the secondary hydroxyl group of the resultant reaction product with (c-3) a dibasic acid anhydride (see claim 13; column 6, lines 29-56, of Arima).

Thus, the copolymeric macromolecular compound (A') of Arima which is a *photosensitive resin having ethylenically unsaturated double bonds*, is quite different from the alkali-soluble macromolecular binder (A) of the claimed invention which *has no ethylenically unsaturated double bond*.

Accordingly, for these reasons, withdrawal of this rejection is respectfully requested.

Claims 1, 3, 5, 6, 9-12 and 14-16 are under 35 U.S.C. §102(b) as being anticipated by Mori et al (JP 10-087769) in view of Tanigami et al (U.S. Patent 5,470,506). Applicant respectfully traverses this rejection.

Mori et al. disclose a resin composition comprising (A) an *unsaturated group-containing* resin produced by reacting (a) an epoxy resin having two or more epoxy groups in its molecule with (b) a compound having one unsaturated double bond and one carboxyl group in its molecule, and optionally (c) a saturated monocarboxylic acid, and optionally further reacting the resultant epoxy (meth)acrylate with (d) a polybasic acid anhydride, (B) a diluent, (C) a photo-polymerization initiator, (D) an inorganic pigment, and (E) a glass powder.

The resin (A) of Mori et al is a *photosensitive resin having unsaturated groups* and, therefore, is quite different from the alkali-soluble macromolecular binder (A) of the claimed invention *having no ethylenically unsaturated double bond*.

On the other hand, Tanigami et al. is directed to a heat generating composition,

more particularly a ceramic heater. Although Tanigami et al. disclose the glass composition including a glass frit as a binder, the composition does not cure the deficiency in Mori et al. since it does not contain a resin binder at all, or teach the alkali-soluble macromolecular binder (A) (having no ethylenically unsaturated double bond) of the claimed invention. Tanigami et al. also fail to teach a photopolymerizable monomer and a photopolymerization initiator.

Thus, since Mori et al. even in view of Tanigami et al. fails to teach each and every limitation of the claims, withdrawal of this rejection is respectfully requested.

Rejections under 35 U.S.C. §103

Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Arima (U.S. Patent 5,741,622) or Mori et al (JP 10-087769) in view of Tanigami et al (U.S. Patent 5,470,506) and further in view of Sugama et al (JP 07-248619). Applicant respectfully traverses this rejection.

To establish a *prima facie* case of obviousness, the cited references, either alone or in combination, must teach or suggest the invention as a whole, including all the limitations of the claims. Here, in this case, the cited references fail to teach or suggest the claim limitation “*having no ethylenically unsaturated double bond*”.

For the reasons noted earlier, both Arima and Mori et al. fail to teach or suggest the alkali-soluble macromolecular binder (A) *having no ethylenically unsaturated double bond* of the claimed invention.

Sugama et al. is directed to a positive type photo-resist composition comprising an alkali-soluble resin, a 1,2-naphthoquinone azide photosensitive agent, and an acid compound. As the alkali-soluble resin, only a novolak resin, a polyvinyl alcohol and a polyvinyl alkyl ether are cited. This reference teaches that a resist formed from this composition is soluble in an alkali solution when exposed to light and even in the unexposed portion, the photosensitive agent is deposited as foreign matter. Thus, the acid compound is added to the composition to shift the composition to a slightly acidic side, thereby preventing the deposition of the photosensitive agent. Therefore, the teaching of Sugama et al. is directed to a positive type photo-resist composition, and not to a negative type photo-resist composition containing no 1,2-naphthoquinone azide photosensitive agent.

Thus, since the photosensitive resins disclosed in Arima and Mori et al. are quite different from the alkali-soluble macromolecular binder (A) *having no ethylenically unsaturated double bond* of the claimed invention, and since the teachings of Tanigami et al and Sugama et al, does not cure this deficiency, this rejection cannot be sustained and should be withdrawn.

Claims 1-16 are rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-2, 4, and 16-20 of U.S. Patent 6,132,937. Applicant respectfully traverses this rejection.

Under U.S. case law, a double patenting rejection of the obviousness-type is “analogous to [a failure to meet] the nonobviousness requirement of 35 U.S.C. § 103. *In re Braithwaite*, 379 F.2d 594, 154 U.S.P.Q. 29 (CCPA 1967). Therefore, any analysis employed in an obviousness-type double patenting rejection parallels the guidelines for analysis of a 35 U.S.C. § 103. *In re Braat*, 937 F.2d 589, 19 U.S.P.Q.2d 1289 (Fed. Cir. 1991).

Thus, to establish a *prima facie* case of obviousness, U.S. Patent 6,132,937 must teach or suggest the invention as a whole, including all the limitations of the claims. Here, in this case, U.S. Patent 6,132,937 fails to teach or suggest the *ether linkages* in the macromolecular binders of the claimed invention.

U.S. Patent 6,132,937 discloses a photocurable composition developable with an aqueous alkaline solution comprising in combination:

(A) an alkali-soluble macromolecular binder having a weight-average molecular weight in the range of 5,000 to 100,000 and an acid value in the range of 50 to 150 mg KOH/g and obtained by causing (c) an organic acid possessing one carboxyl group and no ethylenically unsaturated bond in its molecule to react with the glycidyl group of a copolymer of (a) a compound possessing an ethylenically unsaturated bond and possessing neither hydroxyl group nor acidic group and (b) glycidyl (meth)acrylate and then causing (d) a polybasic acid anhydride to react with the resultant secondary hydroxyl group,

- (B) an inorganic powder,
- (C) a photopolymerizable monomer,
- (D) a photopolymerization initiator, and
- (E) an organic solvent.

The synthetic reaction steps of the alkali-soluble macromolecular binder of U.S.

Patent 6,132,937 may be represented as per the attached sheet (entitled "U.S. Patent 6,132,937").

As is clear from the attached sheet, the resultant product has *ester linkages* indicated by an asterisk. In contrast, the macromolecular binders of the claimed invention have *ether linkages*. Therefore, the structure of the binder of U.S. Patent 6,132,937 is different from the binders of the present invention.

Thus, for this reason, withdrawal of this rejection is respectfully requested.

Claims 1-8, 10-12 and 15 are rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-12 of U.S. Patent No. 6,555,594. Applicant respectfully traverses this rejection.

The carboxyl group-containing resin as an organic binder (B) disclosed by U.S. Patent No. 6,555,594 includes the carboxyl group-containing resins (1), (6), and (7) and the carboxyl group-containing photosensitive resins having an ethylenically unsaturated double bond (2)-(5) and (8) (see col. 5, line 46 to col. 6, line 33, of the reference). Based on Applicant's review of U.S. Patent No. 6,555,594, it is clear that the carboxyl group-containing *photosensitive resins* (2)-(5) and (8) are quite different from the alkali-soluble macromolecular binder (A) *having no ethylenically unsaturated double bond* of the claimed invention.

Further, the carboxyl group-containing resin (1) is obtained by the copolymerization of (a) an unsaturated carboxylic acid with (b) a compound having an unsaturated double bond. This resin corresponds to the copolymer (A-1) as a starting material in the production of the macromolecular binder in accordance with the claimed invention (see the attached sheet).

The carboxyl group-containing resin (6) is obtained by causing (i) an organic acid having one carboxylic group and no ethylenically unsaturated bond in its molecule to react with a glycidyl group of a copolymer of (b) a compound having an unsaturated double bond and glycidyl (meth)acrylate and then causing (d) a polybasic acid anhydride to react with the secondary hydroxyl group caused by the above reaction. Thus, the resultant resin has *ester linkages*, as in the case of the alkali-soluble macromolecular binder (A) of U.S. Patent No. 6,132,937.

In contrast, as already stated, the macromolecular binders of the claimed invention

have *ether linkages*. Thus, the structure of resin (6) of U.S. Patent No. 6,555,594 is different from those of the binders of the claimed invention.

The carboxyl group-containing resin (7) is obtained by causing (d) a polybasic acid anhydride to react with (j) a hydroxyl group-containing polymer, such as olefinic hydroxyl group-containing polymers, acrylic polyols, rubber-based polyols, polyvinyl acetals, styrene-allyl alcohol-based resins, cellulose and its derivatives (see col. 11, lines 25-29, of U.S. Patent No. 6,555,594). Thus, the resultant resin has again *ester linkages* (caused by the reaction of hydroxyl group of the hydroxyl group-containing polymer (j) with the carboxyl group of the polybasic acid anhydride (d)) which are different in structure than the binders of the claimed invention.

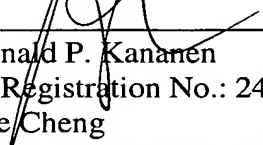
Thus, for these reasons, withdrawal of this rejection is respectfully requested.

CONCLUSION

For the foregoing reasons, all the claims now pending in the present application are believed to be clearly patentable over the outstanding rejections. Accordingly, favorable reconsideration of the claims in light of the above remarks is courteously solicited. If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

Dated: April 6, 2004

Respectfully submitted,

By 
Ronald P. Kananen
Registration No.: 24,104
Lee Cheng
Registration No.: 40,949

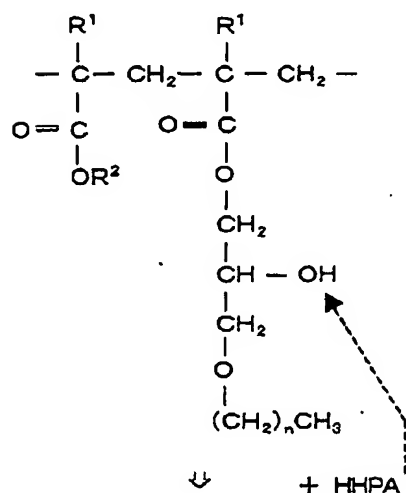
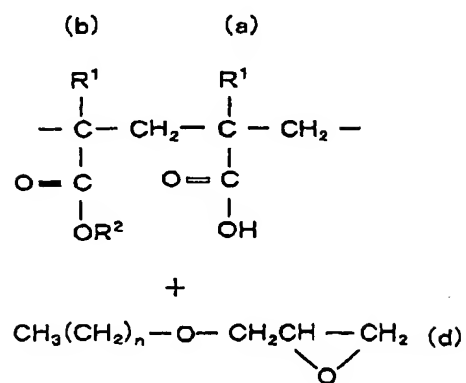
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Attachments

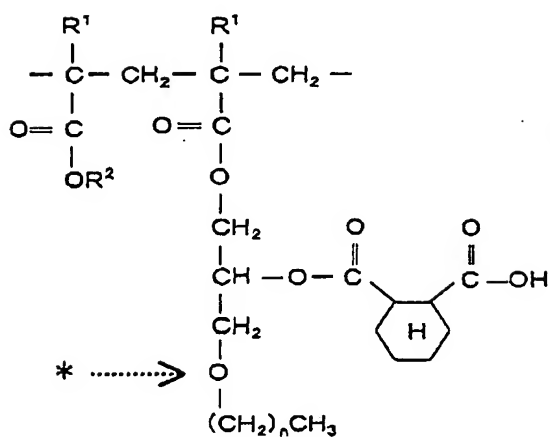
Should additional fees be necessary in connection with the filing of this paper, or if a petition for extension of time is required for timely acceptance of same, the Commissioner is hereby authorized to charge Deposit Account No. 180013 for any such fees; and applicant(s) hereby petition for any needed extension of time.

Present Invention

(A-1)

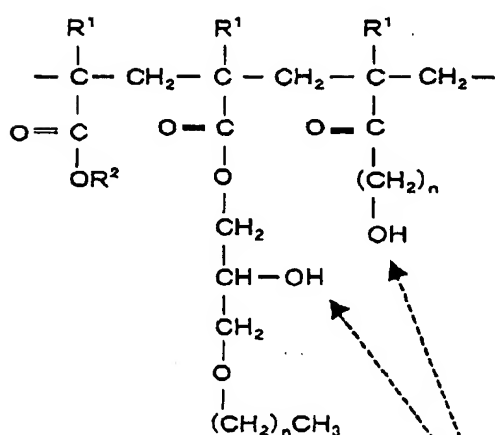
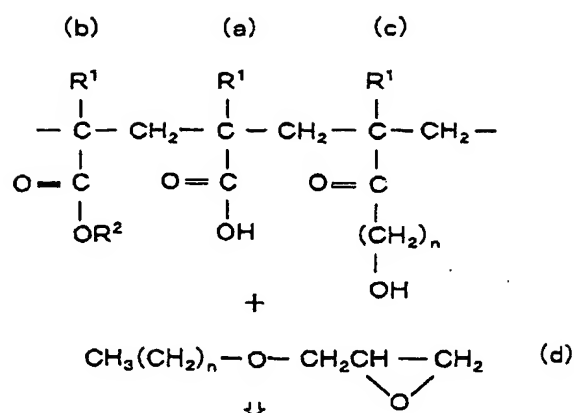


+ HHPA

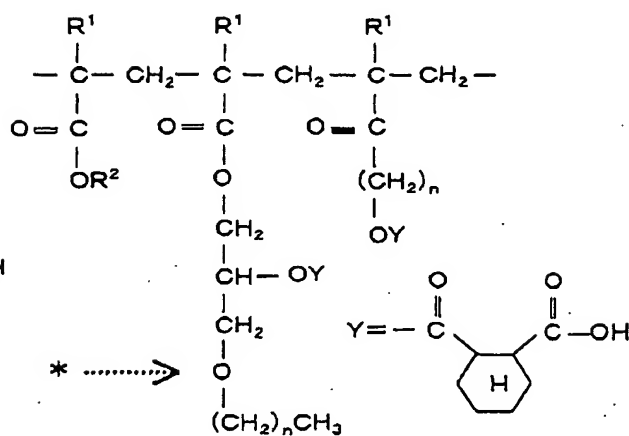


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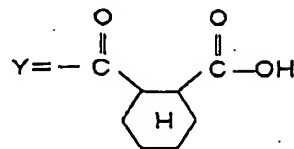
(A-2)



+ HHPA

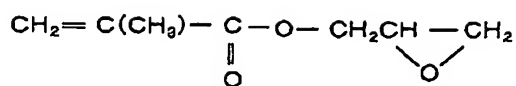
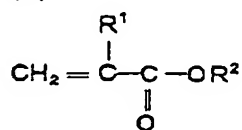
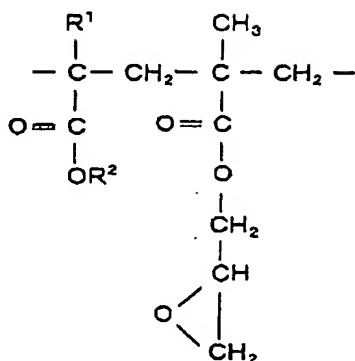
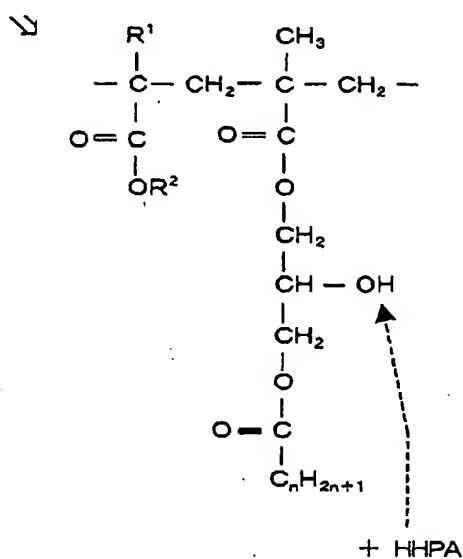


*>



(a)

(GMLA)


$$R^1 = -H, -CH_3$$
$$R^2 = -CH_3, -CH_2CH_3, \text{ etc.} \quad \downarrow \downarrow$$

$$+ \text{Organic acid } (\text{C}_n\text{H}_{2n+1}\text{COOH})$$
 $+ \text{HHPA}$ 